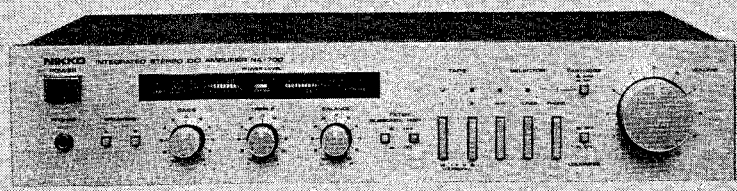
NIKKO AMPLIFIER

NA-700

INTEGRATED AMPLIFIER



TYPE AND VOLTAGE

W-TYPE:	UL and CSA type	120V AC
E-TYPE:	NK-STD type	220V AC
B-TYPE.	BS type	240V AC
V-TYPE:	Multi-Voltage type	110/120/220/240V AC

SERVICE MANUAL

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NA-700

SPECIFICATIONS

Continuous Power Output per channel, 8 ohms:
- 20 ~ 20000 Hz . . . . . more than 55 Watts
- 1000 Hz . . . . . more than 57 Watts

T.H. Distortion, 8 ohms:
- Continuous Power Output. . . . . .no more than 0.03 %
- 1 Watt Power Output. . . . . .no more than 0.04 %

I.M. Distortion, 8 ohms:
- Continuous Power Output. . . . . .no more than 0.03 %
- 1 Watt Power Output. . . . . .no more than 0.04 %

IHF Power Bandwidth, 8 ohms: . . . . . 10 ~ 35000 Hz

Damping Factor, 8 ohms (1 kHz): . . . . . .more than 30

Frequency Response:
- PHONO → TAPE OUT (RIAA Equalization) . . . . . .30 ~ 15000 Hz ± 1 dB
- TUNER, AUX, TAPE IN → Speaker terminals . . . . . 10 ~ 20000 Hz ± 2 dB

Input Sensitivity for 55 Watts Power Output:
- PHONO (M.M) . . . . . .2.3 mV ± 2 dB
- PHONO (M.C) . . . . . 0.23 mV ±2 dB
- TUNER, AUX, TAPE IN . . . . . .150 mV ±2 dB

Phono Maximum Input Capability at 1 kHz: 0.01% T.H.D.:
- (M.M) . . . . . .more than 150 mV
- (M.C) . . . . . .more than 15 mV

Output Level at 55 Watts Power Output, (Input: PHONO)
- TAPE OUT . . . . . 140 mV ± 2 dB

Tone Control: BASS (70 Hz) Boost . . . . . +7.5 dB ± 2 dB
Cut. . . . . −7.5 dB ±2 dB
TREBLE (10 kHz) Boost. . . . . .+7.5 dB ± 2dB
Cut. . . . . −7.5 dB ± 2 dB

Loudness Control (Volume control set at −30 dB Position):
- 70 Hz . . . . . .+10 dB ± 2 dB
- 10 kHz . . . . . .+5 dB ± 2 dB

Subsonic Filter, (15 Hz) . . . . . −3 dB ± 2 dB

High Filter, (8 kHz) . . . . . −3 dB ± 2 dB

Signal to Noise Ratio: IHF "A" Network:
- PHONO (M.M) . . . . . .better than 80 dB
- PHONO (M.C) . . . . . .better than 60 dB
- TUNER, AUX, TAPE IN . . . . . .better than 95 dB

Idling Current: . . . . . 2 ~ 60 mA

Midpoint Voltage: . . . . . .0 V ± 250 mV

Muting Delay Time: . . . . . .2 ~6 seconds

GENERAL

Power Requirement:
- U.S.A. & Canada Model . . . . . AC120V 60 Hz
- European Model . . . . . AC220V 50 Hz
- England Model . . . . . AC240V 50 Hz

Multi-Voltage Model . . . . . AC110/120/220/240V (Switchable), 50/60 Hz

Power Consumption:
- U.S.A. & Canada Model . . . . . .230 W (CSA)
- Other Model. . . . . 370W (CEE)

Dimensions (Width): . . . . . 440 mm (17-1/4 inches)
(Height): . . . . . 96 mm (3-3/4 inches)
(Depth): . . . . . 335 mm (11-1/4 inches)

Weight: . . . . . .5.8 kg (12.7 lbs)

Specifications are subject to change without notice.

NIKKO Service Data

MODEL: NA-700II

Important Information for your Parts and Service Department

1. The following are the list for the CABINET, CHASSIS and BACK PLATE ASSEMBLY of NA-700II. Refer to the Service Manual for NA-700 for details of other parts, SCHEMATIC DIAGRAM and ALIGNMENT.

REF. NO.	TYPE W	TYPE E	DESCRIPTION	PART NO.
	CABINET ASSEMBLY			
101-a	1	—	PANEL, FRONT	7887050
101-b	—	1	PANEL, FRONT	PRSA00711
102	1	1	PANEL, LEFT SIDE	7404300
103	1	1	PANEL, RIGHT SIDE	7404310
104	1	1	WINDOW, PANEL	7870800
105	3	3	GLOBE, LED	7404200
106	1	1	KNOB-320BK-42DR-VOLUME	7854180
107-a	3	—	KNOB-P15DBK-BASS/TRABLE/BALANCE	7853390
107-b	—	1	KNOB-P15DBK-E-BASS/TRABLE/BALANCE	NOBA024
108	1	1	BUTTON, PUSH-P1420BK-POWER	7852870
109	5	5	BUTTON, PUSH-P1416BK-TAPE/SELECTOR	7854190
110-a	1	1	BUTTON, PUSH-P4SQBK-CARTRIDGE	7852530
110-b	5	5	BUTTON, PUSH-P414BK-OTHERS	7852510
111	1	1	SHAFT, EXTENSION-25U	7404230
112	1	1	PIPE, EXTENSION-186	7903580
113	1	1	SPRING-C8101	7441440
114	3	3	SHAFT, EXTENSION-16.5M	7405030
115	3	3	SHAFT, EXTENSION-24M	7404110
116-a	1	—	SCALE, POWER LEVEL INDICATOR	7803380
116-b	—	1	SCALE, POWER LEVEL INDICATOR	INJP02821
117	1	1	COVER, TOP	7821770
118	1	1	PLATE, BOTTOM	7327850
119	4	4	FOOT, PLASTIC	7401080
	CHASSIS ASSEMBLY			
201	1	1	SWITCH, PUSH-SUR510-PHONO SELECTOR	4042160
202	1	1	WIRE, REMOTE CONTROL	4582910
203	1	1	POWER LEVEL INDICATOR ASSEMBLY-LT-1040	5060560
204-a	1	—	TRANSFORMER, POWER-T-1-484	1104840
204-b	—	1	TRANSFORMER, POWER-T-1-485	1104850
	BACK PLATE ASSEMBLY			
301-a	1	—	PLATE, BACK-(W)	7328100
301-b	—	1	PLATE, BACK-(E)	7328110
302-a	1	—	CORD, AC LINE-SPT-2 (POL)	ACC0025
302-b	—	1	CORD, AC LINE-CEE-2T	600518A
303	1	1	BUSH, POWER CORD-SR-4N-4	7400690
304	1	—	SOCKET, AC OUTLET	SKT0086
305	1	1	TERMINAL, GND-1P	4450660

2. The follwing has been changed on the NA-700 and 700II.

REF. NO.	TYPE W	TYPE E	DESCRIPTION	PART NO.
	AMPLIFIER PC BOARD ASSEMBLY (MAIN AMP & TONE CONTROL SECTION)			
Q701, 702	2	2	FET μPA68H	516050S
C707, 708	2	2	C-CAP 22pF 10% 50V SL	23222OK
R715 ~ 718	4	4	RES 100 ohm 5% 1/4W	328101J

ASTI PACIFIC CORPORATION
1318 Nishijima-cho, Hamamatsu, 430 Japan

ASTI NIKKO EUROPA VERTRIEBS GMBH
Haidesdorfer Str. 102·2000 Hamburg 71·West Germany

ASTI NIKKO TECHNOLOGY CORPORATION OF AMERICA
5830 South Triangle Drive Commerce, CA 90040 U.S.A.

MNL048AM Printed in Japan

BLOCK DIAGRAM

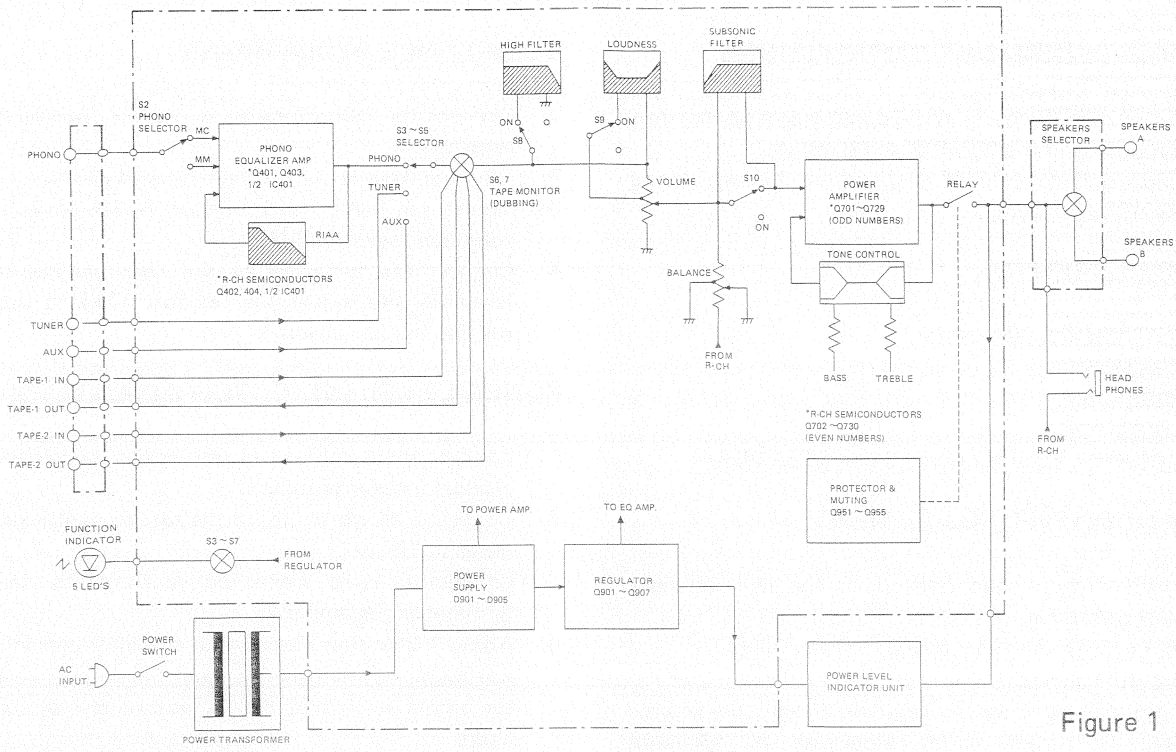


Figure 1

DISASSEMBLY

CABINET COVER REMOVAL

a. Remove four screws from both sides of the metal cover.
b. Remove two tapping screws from the rear of the metal cover.
c. Lift the cover away from the unit.

BOTTOM PLATE REMOVAL

a. Remove seven tapping screws (#1 ~ #7) and two transformer screws (#8 and #9) from the bottom of the unit as shown in Photo 1.
b. Lift the bottom plate away from the unit.

FRONT PANEL REMOVAL

a. Remove the bottom plate.
b. Remove two tapping screws (#10 and #11) from the bottom of the unit as shown in Photo 1.
c. Remove two tapping screws (#1 and #2) from the top of the unit as shown in Photo 2.
d. Remove the front panel away from the unit by pulling it forward.

POWER TRANSFORMER REMOVAL

a. Remove the bottom plate.
b. Disconnect all the power transformer cables.
c. Remove two screws (#12 and #13) from the rear of the unit as shown in Photo 1.
d. Lift the power transformer away from the unit.

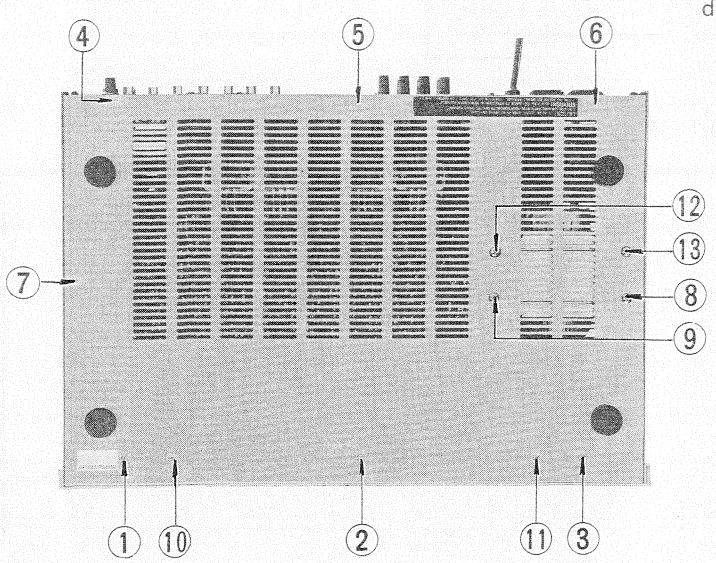


Photo 1

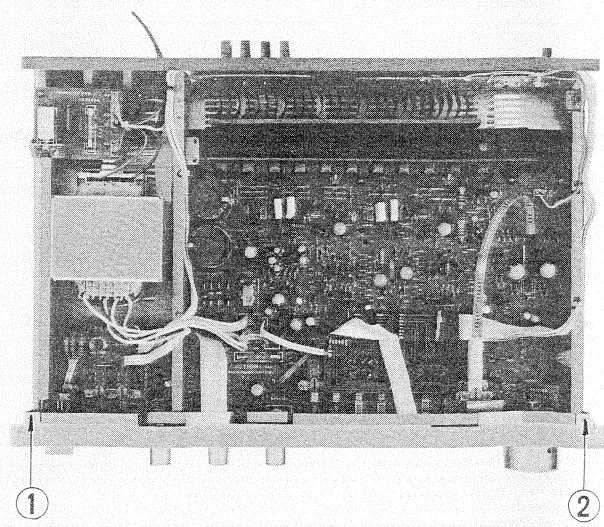


Photo 2

ALIGNMENT

GENERAL ALIGNMENT INSTRUCTIONS

1. Allow a minimum of 10 minutes warm-up for test equipments and the amplifier to be tested.
2. Always observe response curve on oscilloscope during alignment procedure.

TEST EQUIPMENTS

1. Audio Frequency Generator
2. Oscilloscope
3. AC Voltmeter
4. DC Voltmeter
5. Two Dummy Load Resistors, 8 ohms/250 Watts

IDLING CURRENT ADJUSTMENT

1. Connect dummy load resistors to the left and right speaker terminals.
2. Connect a DC voltmeter across the test points.. (refer to Figure 3)
3. The input signal is not added at all. Simply, the volume control is turned counter-clockwise to minimum position.
4. Adjust the semi fixed resistor R741 (left channel) or R742 (right channel) so that the DC voltmeter indicates 2 ~ 3 mV.

DC BALANCE ADJUSTMENT

1. Connect the DC voltmeter to the left channel speaker terminals.
2. Turn the volume control fully counter-clockwise.
3. Adjust the semi fixed resistor R713 until the DC voltmeter indicates 0 Volt.
4. Connect the voltmeter to the right channel speaker terminals and ajdust the resistor R714 to the same value as the left channel.

POWER LEVEL INDICATOR ADJUSTMENT

1. Connect the dummy load resistors to the left and right channel speaker terminals.
2. Connect a AC voltmeter to the speaker terminals. (refer to Figure 2)
3. Connect a audio frequency generator to the AUX terminal of the amplifier.
4. Apply 1 kHz sine-wave to the amplifier and adjust the attenuator of the generator and the volume control of the amplifier so that the AC voltmeter indicates 21.0 Volts.
5. Adjust the semi-fixed resistor R923 so that all LED in the left channel light up similarly to the right channel.

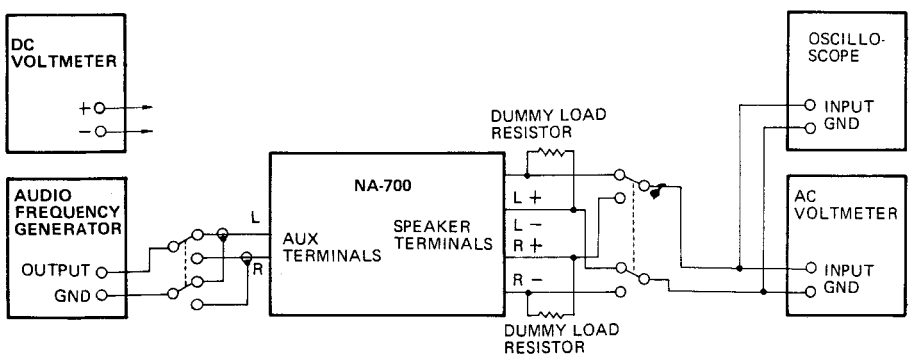


Figure 2 TEST EQUIPMENT HOOK-UP

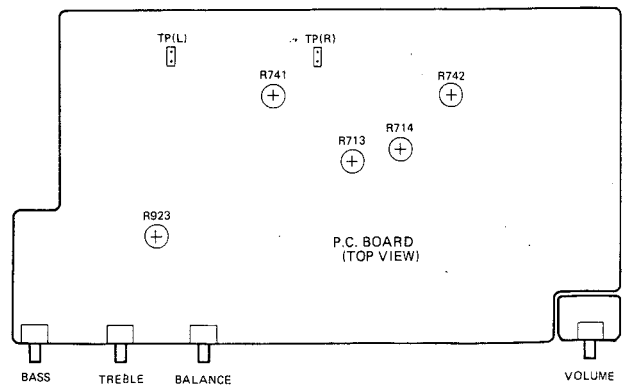


Figure 3 ADJUSTMENT POINTS

POWER TRANSISTORS MOUNTING ASSEMBLY

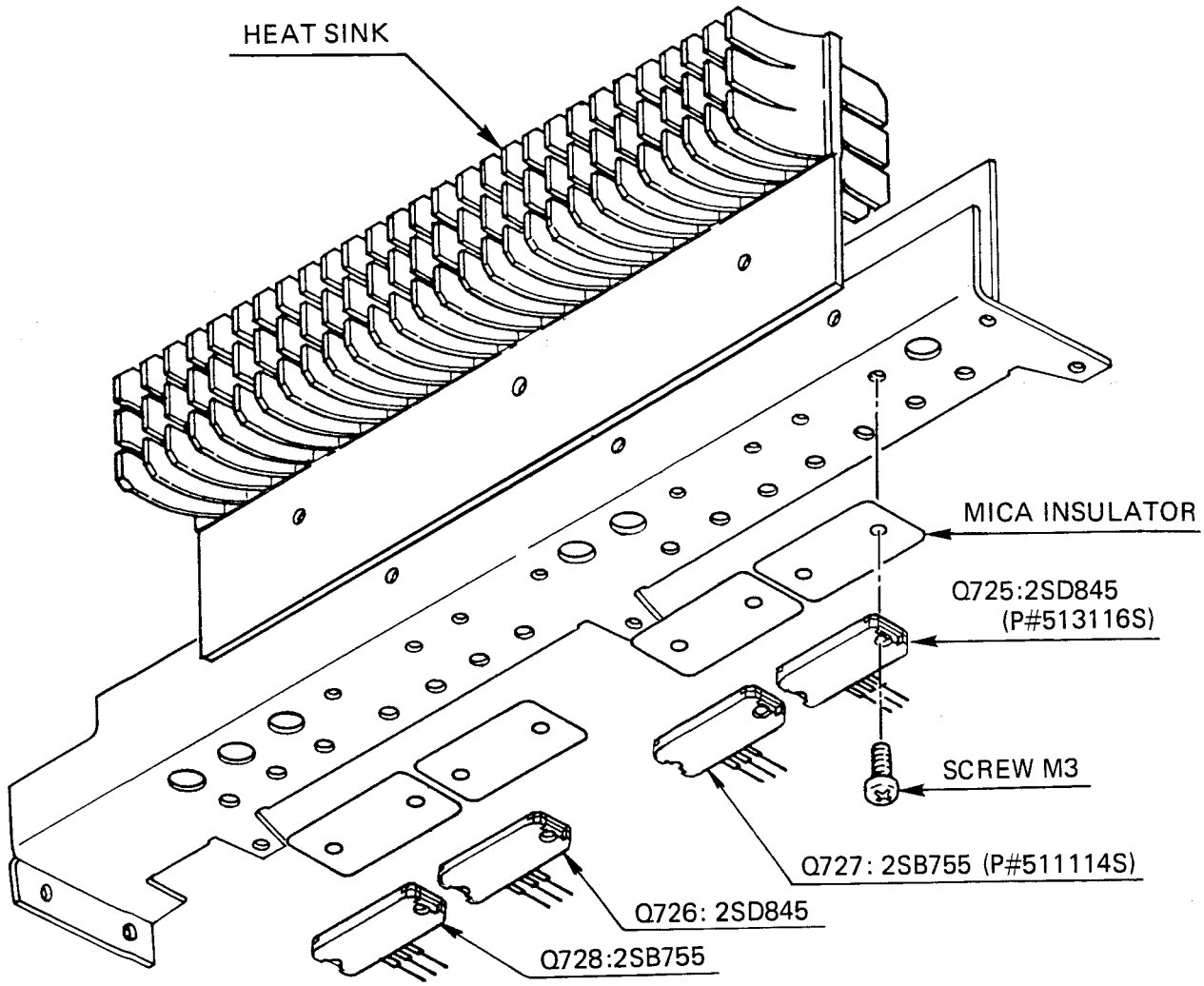


Figure 4

NOTE: For best heat conduction, use thermally conductive silicon grease between the power transistor and the mica insulator and between the insulator and the heat sink.

PRECAUTIONS FOR REPAIR SERVICE

Many of these items are included just as a reminder – they are normal procedures for experienced technicians. Short-cuts can be taken: but, often they cause additional damage to transistors, circuit components or the printed circuit board.

1. **Do not** bridge electrolytic capacitors with AC power. The resultant surges may damage solid state devices.
2. **Do not** bias the base of any transistor while voltage is being applied to its collector.
3. Replacements for output and driver transistors, if necessary, must be made from the same **hfe** group as the original type. Be sure to include this information when ordering replacement transistors.
4. If one output transistor burns out (open or shorts), always remove **all** output transistors in that channel and check the bias adjustment, the control and other parts in the network with an ohmmeter before inserting a new transistor. All output transistors in one channel will be destroyed if the base biasing circuit is open in the emitter end.

PARTS LOCATION

NOTE: Numbers of three digits with a ◯ are related to the REF NUMBERS on parts list.

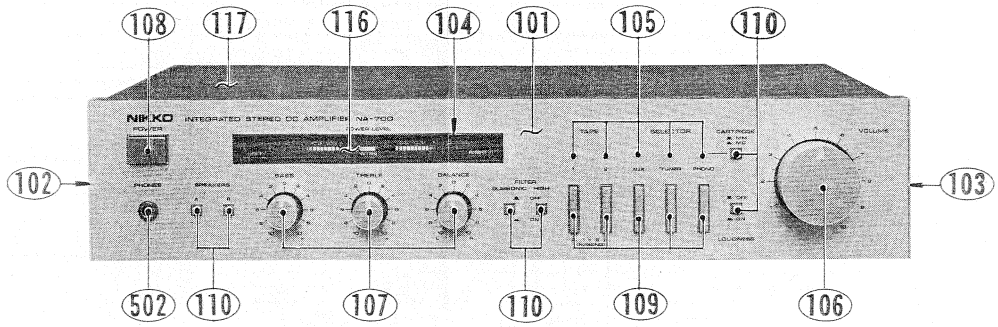


Photo 3

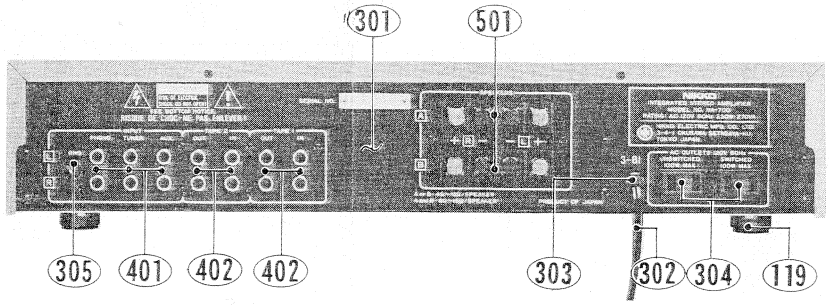


Photo 4

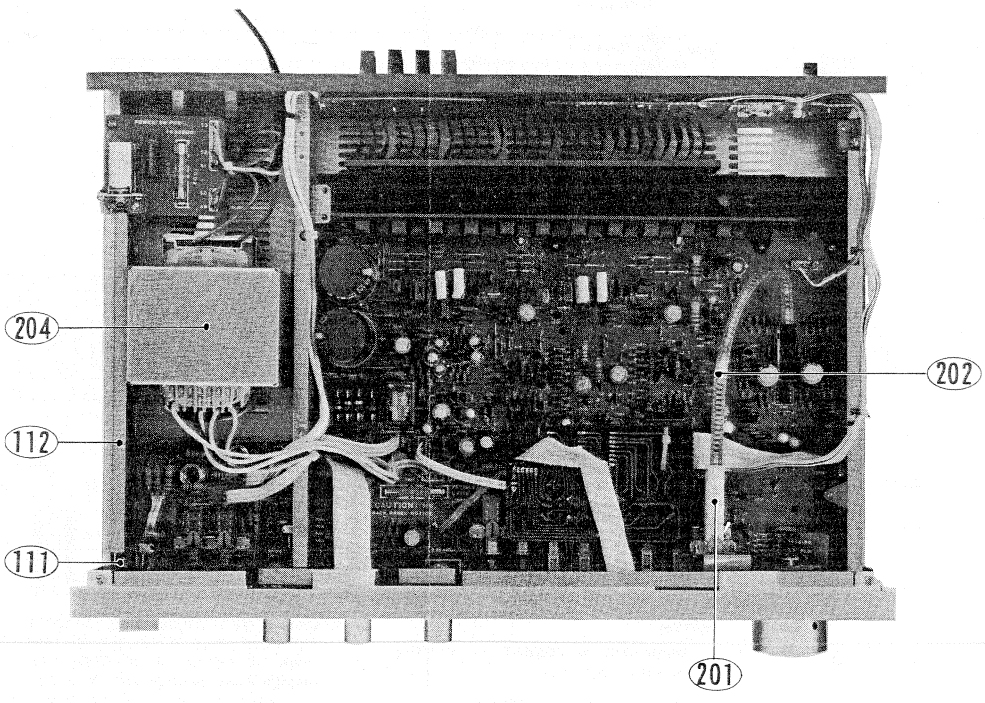
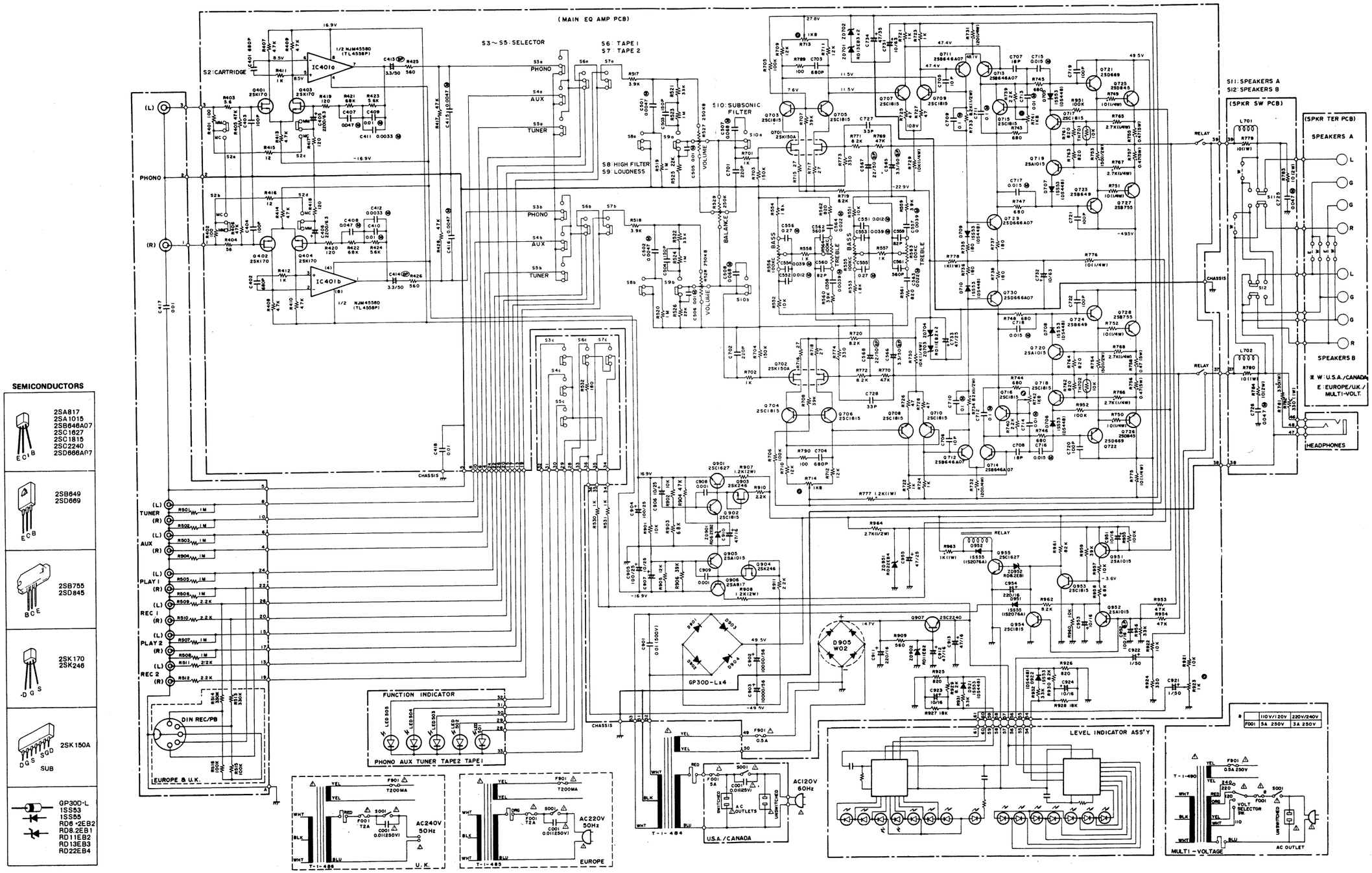


Photo 5

SCHEMATIC DIAGRAM Figure 5



SEMICONDUCTORS

2SA817 2SA1015 2SB646A07 2SC1627 2SC1815 2SC2240 2SD666A07	E C B
2SB649 2SD669	E C B
2SB755 2SD845	B C E
2SK170 2SK246	D G S
2SK150A SUB	D G S S G D
GP30D-L 1SS53 1SS55 RD6.2EB2 RD8.2EB1 RD11EB2 RD13EB3 RD22EB4	

NOTES:

1. SCHEMATIC IS SUBJECT TO CHANGE WITHOUT NOTICE.

UNLESS OTHERWISE SPECIFIED:

2. RESISTANCE VARUES ARE IN OHMS. K = 1,000 : M = 1,000,000
3. CAPACITANCE VALUES 1.0 AND ABOVE ARE IN pF OR μF (P = pF, M = μF), LESS THAN 1.0 ARE IN μF. (ELECTROLYTIC CAPACITANCE VALUES ARE IN μF/WV.)
4. VOLTAGES ARE MEASURED TO CHASSIS GROUND WITH A "DC VOLTMETER". (V) : VOLTAGES MEASURED WITH NO SIGNAL APPLIED

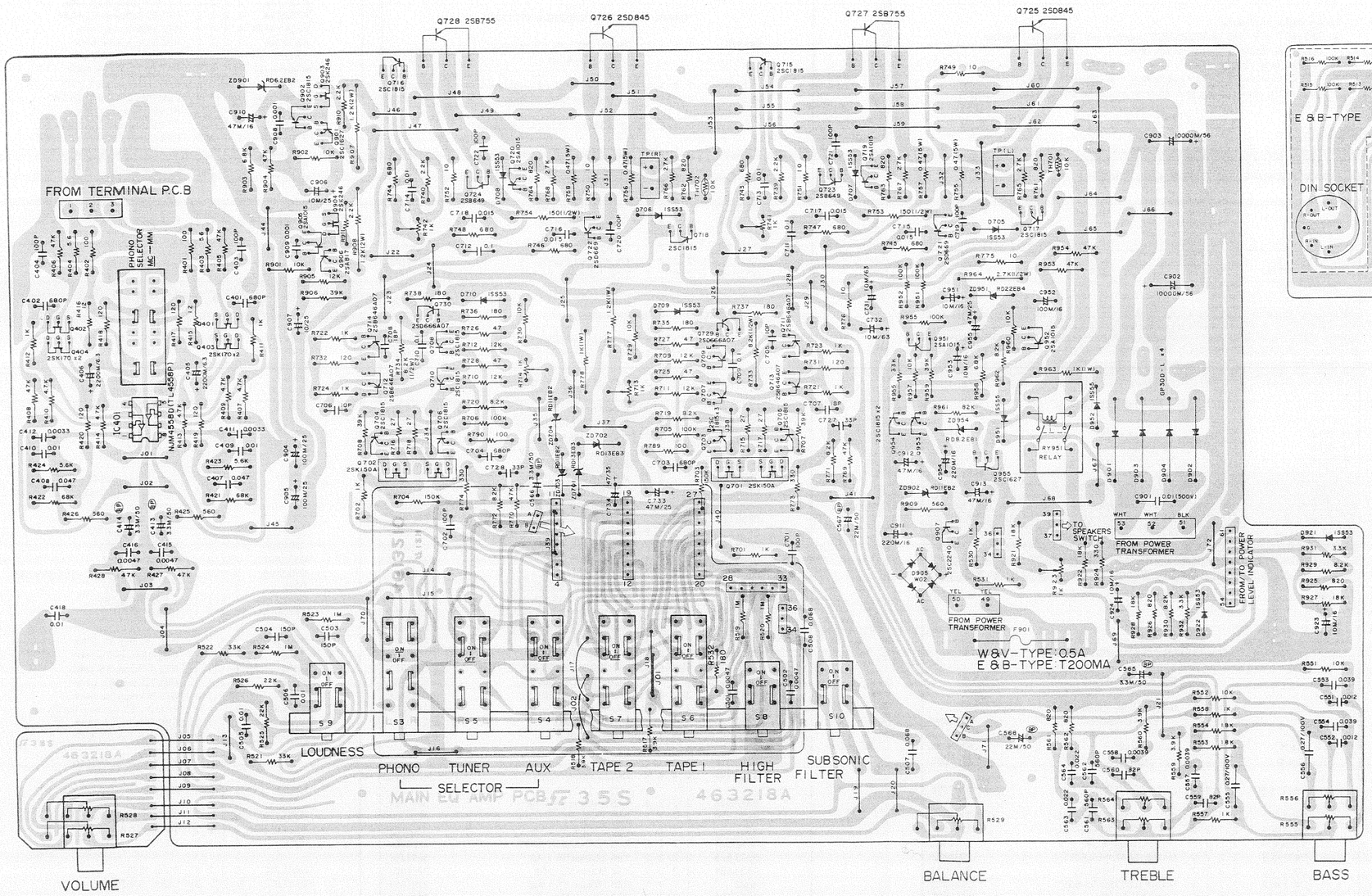
SCHEMATIC SYMBOLS:

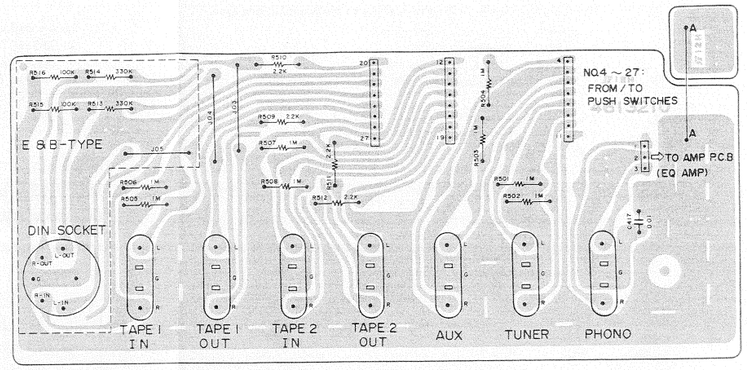
Ⓜ POLYESTER FILM CAPACITOR
Ⓑ BIPOLAR CAPACITOR
● NONFLAMMABLE RESISTOR

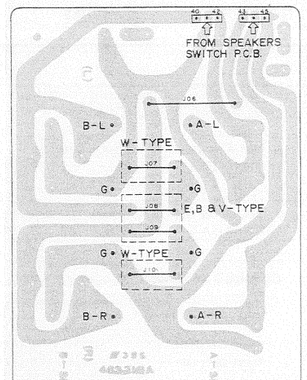
WARNING:

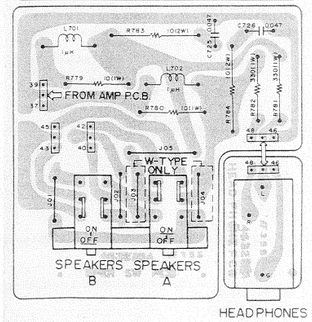
⚠ INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.

PC BOARD (Conductive Side View) Figure 6









PARTS LIST

NOTES:

1. ★ The REF. NUMBER (#) marked with a (★) on parts list related to number of three digits with a (◯). (Photo 3 ~ 6)

2. + Numberalas in file indicate the quantity of parts used in one type.
   - W – TYPE: U.S.A. & Canada model
   - E – TYPE: European model
   - B – TYPE: U.K. & Australia model
   - V – TYPE: Multi-voltage model

3. ++
   - TR: Transistor
   - FET: Field effect transistor
   - VR: Volume control (Variable resistor)
   - RES: Carbon film fixed resistor
   - MO-RES: Metal oxide film fixed resistor
   - CEM-RES: Cemented wirewound fixed resistor
   - FP: Flame proof
   - C-CAP: Ceramic capacitor
   - E-CAP: Aluminum electrolytic capacitor
   - M-CAP: Polyester film capacitor
   - S-CAP: Polystyrene film capacitor
   - T-CAP: Tantalum electrolytic capacitor
   - BP-CAP: Bipolar electrolytic capacitor
   - LC-CAP: Low current leakage electrolytic capacitor

4. Assemblies and parts are subject to change without notice.

5. Parts ordering procedure:
   A. DO NOT USE THE "REFERENCE" number and "SYMBOL" number. (these are control # for the factory only)
   B. Include in any order
      a. Part number. b. Part description. c. Model number.
      (any of the above lacking from an order may delay shipment of that order.)

WARNING:
⚠ INDICATES SAFETY CRITICAL COMPONENTS.
FOR CONTINUED SAFETY' REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS'

REF. NO.	SYMBOL NO.	TYPE+ W E B V	DESCRIPTION++	PART NO.
			PACKING MATERIALS & ACCESSORIES	
	001	1 1 1 1	Carton box	9826210
	002	2 2 2 2	Pad	9841100
	003	1 1 1 1	Sack, polyethylen cloth	9640720
	004	1 1 1 1	Sack, polyethylen cloth – #13	9640320
	005a	1 – – –	Manual, instructions – in English and French	960375E
	005b	– 1 1 1	Manual, instruction – in five different languages	960375K
	006	– – – 1	Manual, voltage selection	960376K
	007	1 – – –	Card, warranty	967043A
	008	1 – – –	List, service stations	9690210
	009	– – – 1	Adaptor, AC plug	4550230
			CABINET ASSEMBLY	
★	101	1 1 1 1	Panel, front	7885900
★	102	1 1 1 1	Panel, left side	7404210
★	103	1 1 1 1	Panel, right side	7404220
★	104	1 1 1 1	Window, panel	7870800
★	105	3 3 3 3	Globe, LED	7404200
★	106	1 1 1 1	Knob – 20SL-42DR – volume	7841550
★	107	3 3 3 3	Knob – 520SL-16DR – bass/treble/balance	7841600
★	108	1 1 1 1	Button, push – P1420SL – power	7852860
★	109	5 5 5 5	Button, push – P424ST – tape/selector	7852930
★	110	6 6 6 6	Button, push – P4SQST – others	7852940
★	111	1 1 1 1	Shaft, extension – 25U	7404230
★	112	1 1 1 1	Pipe, extension – 186	9703580
	113	1 1 1 1	Spring – C8101	7441440
	114	3 3 3 3	Shaft, extension – 16.5M	7403140
	115	3 3 3 3	Shaft, extension – 24M	7404110
★	116	1 1 1 1	Scale, power level indicator	7802960
★	117	1 1 1 1	Cover, top	7821320
★	118	1 1 1 1	Plate, bottom	7327620
★	119	4 4 4 4	Foot, plastic	7401080
			CHASSIS ASSEMBLY	
★	201	1 1 1 1	Switch, push – SUR510 – phono selector	4042160
★	202	1 1 1 1	Wire, remote control	4582910
	203	1 1 1 1	Power level indicator assembly – LT-1040	5060560
⚠ ★	204a	1 – – –	Transformer, power – T-1-484 – AC120V	1104840
⚠ ★	204b	– 1 – –	Transformer, power – T-1-485 – AC220V	1104850
⚠ ★	204c	– – 1 –	Transformer, power – T-1-486 – AC240V	1104860

REF. NO.	SYMBOL NO.	TYPE+ W E B V	DESCRIPTION++	PART NO.
⚠ ★	204d	– – – 1	Transformer, power – T-1-490 – AC110/120/220/240V	1104900
⚠	205	– – – 1	Switch, rotary – voltage selector	4530540
			BACK PLATE ASSEMBLY	
★	301a	1 – – –	Plate, back – (W)	7327600
★	301b	– 1 1 –	Plate, back – (E)	7327610
★	301c	– – – 1	Plate, back – (U/T)	7327650
⚠ ★	302a	1 – – 1	Cord, AC line – DP-70	6060070
⚠ ★	302b	– 1 – –	Cord, AC line – CEE-2T	600510A
⚠ ★	302c	– – 1 –	Cord, AC line – BS	600514A
⚠ ★	303a	1 – – 1	Bush, power cord – SR-3P-4	7400620
⚠ ★	303b	– 1 1 –	Bush, power cord – SR-4N-4	7400690
⚠ ★	304	2 – – 1	Socket AC outlet	4500190
★	305	1 1 1 1	Terminal, GND – 1P	4450570
			AMPLIFIER PC BOARD ASSEMBLY	
			(EQ AMP SECTION)	
	S2	1 1 1 1	Switch, slide – SSR24351D – phono selector	4020590
	IC401	1 1 1 1	IC NJM4558D	518056S
	(IC401)	(1 1 1 1)	IC TL4558P	518129S
	Q401~Q404	4 4 4 4	FET 2SK170 (GR)	516039S
	C401,402	2 2 2 2	C-CAP 680pf 10% 50V SL	232681K
	C403,404	2 2 2 2	C-CAP 100pf 10% 50V SL	232101K
	C405,406	2 2 2 2	E-CAP 2200μf 6.3V	211042S
	C407,408	2 2 2 2	M-CAP 0.047μf 5% 50V	222473J
	C409,410	2 2 2 2	M-CAP 0.01μf 5% 50V	222103J
	C411,412	2 2 2 2	M-CAP 0.0033μf 5% 50V	222332J
	C413,414	2 2 2 2	BP-CAP 3.3μf 50V	215513N
	C415,416	2 2 2 2	M-CAP 0.0047μf 5% 50V	222472J
	R401,402	2 2 2 2	RES 100ohm 5% 1/4W	328101J
	R403,404	2 2 2 2	RES 5.6ohm 5% 1/4W	328568J
	R405,406	2 2 2 2	RES 47kohm 5% 1/4W	328473J
	R407~R410	4 4 4 4	RES 4.7kohm 5% 1/4W	328472J
	R411,412	2 2 2 2	RES 1kohm 5% 1/4W	328102J
	R413,414	2 2 2 2	RES 4.7kohm 5% 1/4W	328472J
	R415,416	2 2 2 2	RES 12ohm 5% 1/4W	328120J
	R417~R420	4 4 4 4	RES 120ohm 5% 1/4W	328121J
	R421,422	2 2 2 2	RES 68kohm 5% 1/4W	328683J
	R423,424	2 2 2 2	RES 5.6kohm 5% 1/4W	328562J
	R425,426	2 2 2 2	RES 560ohm 5% 1/4W	328561J
	R427,428	2 2 2 2	RES 47kohm 5% 1/4W	328473J

PART ORDERING PROCEDURE ----- DO NOT USE THE "REF" NUMBER AND "SYMBOL" NUMBER. (these are control # for the factory only.) Include in any order: a. Part number, b. Part description, c. Model number. (any of the above lacking from an order may delay shipment of the order.)

REF. NO.	SYMBOL NO.	TYPE+ W E B V	DESCRIPTION++	PART NO.
			(MAIN AMP & TONE CONTROL SECTION)	
	S3~S10	1 1 1 1	Switch, octa push – filters/tape/selector/loudness	4042150
	R527,528	1 1 1 1	VR 250kohm (B) x 2 – volume	4321160
	R529	1 1 1 1	VR 250kohm (SW) – balance	4310620
	R555,556, R563,564	2 2 2 2	VR 100kohm (C) x 2 – bass/treble	4321040
	Q701,702	2 2 2 2	FET 2SK150A (GR or BL)	516038S
	Q703~Q710	8 8 8 8	TR 2SC1815 (Y or GR)	512107S
	Q711~Q714	4 4 4 4	TR 2SB646A07 (B or C)	511115S
	Q715~Q718	4 4 4 4	TR 2SC1815 (Y or GR)	512107S
	Q719,720	2 2 2 2	TR 2SA1015 (Y or GR)	510102S
	Q721,722	2 2 2 2	TR 2SD669 (B or C)	513104S
	Q723,724	2 2 2 2	TR 2SB649 (B or C)	511104S
	Q725,726	2 2 2 2	TR 2SD845 (R or O)	513116S
	Q727,728	2 2 2 2	TR 2SB755 (R or O)	511114S
	Q729,730	2 2 2 2	TR 2SD666A07 (B or C)	511020S
	D705~D710	6 6 6 6	Diode 1SS53	501023S
	(D705~D710)	(6 6 6 6)	Diode DS448	501026S
	ZD701,702	2 2 2 2	Zener diode RD13EB3	502063S
	ZD703,704	2 2 2 2	Zener diode RD11EB2	502089S
	TH701,702	2 2 2 2	Thermistor D2FHL-103S	5400180
	C501,502	2 2 2 2	M-CAP 0.0047μf 10% 50V	222472K
	C503,504	2 2 2 2	C-CAP 150pf 10% 50V SL	232151K
	C505,506	2 2 2 2	C-CAP 0.01μf 10% 50V	222103K
	C507,508	2 2 2 2	M-CAP 0.068μf 10% 50V	222683K
	C551,552	2 2 2 2	M-CAP 0.012μf 10% 50V	222123K
	C553,554	2 2 2 2	M-CAP 0.039μf 10% 50V	222393K
	C555,556	2 2 2 2	M-CAP 0.27μf 10% 100V	281274K
	C557,558	2 2 2 2	M-CAP 0.0039μf 10% 50V	222392K
	C559,560	2 2 2 2	C-CAP 82pf 10% 50V SL	232820K
	C561,562	2 2 2 2	C-CAP 560pf 10% 50V SL	232561K
	C563,564	2 2 2 2	M-CAP 0.022μf 10% 50V	222223K
	C565,566	2 2 2 2	BP-CAP 3.3μf 50V	215513C
	C567,568	2 2 2 2	BP-CAP 22μf 50V	215522C
	C701,702	2 2 2 2	C-CAP 220pf 10% 50V SL	232221K
	C703,704	2 2 2 2	C-CAP 680pf 10% 50V SL	232681K
	C705,706	2 2 2 2	C-CAP 10pf 10% 50V SL	232100K
	C707,708	2 2 2 2	C-CAP 18pf 10% 50V SL	232180K
	C709~C712	4 4 4 4	M-CAP 0.1μf 10% 50V	222104K
	C713,714	2 2 2 2	M-CAP 0.01μf 10% 50V	222103K
	C715~C718	4 4 4 4	M-CAP 0.015μf 10% 50V	222153K
	C719~C722	4 4 4 4	C-CAP 100pf 10% 50V SL	232101K
	C727,728	2 2 2 2	C-CAP 33pf 10% 50V SL	232330K
	C731,732	2 2 2 2	E-CAP 10μf 63V	211620S
	C733	1 1 1 1	E-CAP 47μf 25V	211325S
	C734	1 1 1 1	E-CAP 47μf 35V	211425S
	R713,714, R741,742	4 4 4 4	Potentiometer 1kohm	4300720
	R517,518	2 2 2 2	RES 3.9kohm 5% 1/4W	328392J
	R519,520	2 2 2 2	RES 1meg.ohm 5% 1/4W	328105J
	R521,522	2 2 2 2	RES 33kohm 5% 1/4W	328333J
	R523,524	2 2 2 2	RES 1meg.ohm 5% 1/4W	328105J
	R525,526	2 2 2 2	RES 22kohm 5% 1/4W	328223J
	R530,531	2 2 2 2	RES 1kohm 5% 1/4W	328102J
	R532	1 1 1 1	RES 180ohm 5% 1/4W	328181J
	R551,552	2 2 2 2	RES 10kohm 5% 1/4W	328103J
	R553,554	2 2 2 2	RES 1.8kohm 5% 1/4W	328182J
	R557,558	2 2 2 2	RES 1kohm 5% 1/4W	328102J
	R559,560	2 2 2 2	RES 3.9kohm 5% 1/4W	328392J
	R561,562	2 2 2 2	RES 820ohm 5% 1/4W	328821J
	R701,702	2 2 2 2	RES 1kohm 5% 1/4W	328102J
	R703,704	2 2 2 2	RES 150kohm 5% 1/4W	328154J
	R705,706	2 2 2 2	RES 100kohm 5% 1/4W	328104J
	R707,708	2 2 2 2	RES 39kohm 5% 1/4W	328393J
	R709~R712	4 4 4 4	RES 12kohm 5% 1/4W	328123J
	R715~R718	4 4 4 4	RES 27ohm 5% 1/4W	328270J
	R719,720	2 2 2 2	RES 8.2kohm 5% 1/4W	328822J
	R721~R724	4 4 4 4	RES 1kohm 5% 1/4W	328102J
	R725~R728	4 4 4 4	RES 47ohm 5% 1/4W	328470J
	R729,730	2 2 2 2	FP-RES 10kohm 5% 1/4W	328103L

REF. NO.	SYMBOL NO.	TYPE+ W E B V	DESCRIPTION++	PART NO.
	R731,732	2 2 2 2	FP-RES 120ohm 5% 1/4W	328121L
	R733,734	2 2 2 2	FP-RES 8.2kohm 5% 1/2W	329822L
	R735~R738	4 4 4 4	RES 180ohm 5% 1/4W	328181J
	R739,740	2 2 2 2	RES 2.2kohm 5% 1/4W	328222J
	R743~R748	6 6 6 6	RES 680 ohm 5% 1/4W	328681J
	R749~R752	4 4 4 4	FP-RES 10ohm 5% 1/4W	328100L
	R753,754	2 2 2 2	FP-RES 150ohm 5% 1/2W	329151L
	R755~R758	4 4 4 4	CEM-RES 0.47ohm 10% 5W	384479W
	R761~R764	4 4 4 4	RES 820ohm 5% 1/4W	328821J
	R765~R768	4 4 4 4	FP-RES 2.7kohm 5% 1/4W	328272L
	R769,770	2 2 2 2	RES 47kohm 5% 1/4W	328473J
	R771,772	2 2 2 2	RES 8.2kohm 5% 1/4W	328822J
	R773,774	2 2 2 2	RES 330ohm 5% 1/4W	328331J
	R775,776	2 2 2 2	FP-RES 10ohm 5% 1/4W	328100L
	R777	1 1 1 1	FP-MO-RES 1.2kohm 5% 1W	361122L
	R778	1 1 1 1	FP-MO-RES 1kohm 5% 1W	361102L
	R789,790	2 2 2 2	RES 100ohm 5% 1/4W	3282101J
			(REGULATOR SECTION)	
⚠	F901	1 – – 1	Fuse – 0.5A 250V	4700560
⚠	F901	– 1 1 –	Midget fuse – T200MA 250V	4720440
	Q901	1 1 1 1	TR 2SC1627 (O or Y)	511017S
	Q902	1 1 1 1	TR 2SC1815 (Y or GR)	512107S
	Q903,904	2 2 2 2	FET 2SK246 (Y or GR)	516043S
	Q905	1 1 1 1	TR 2SA1015 (Y or GR)	510102S
	Q906	1 1 1 1	TR 2SA817 (O or Y)	510047S
	Q907	1 1 1 1	TR 2SC2240 (GR or BL)	512102S
	D901~D904	4 4 4 4	Diode GP30D-L	560063S
	D905	1 1 1 1	Diode W02	560061S
	ZD901	1 1 1 1	Zener diode RD6.2EB2	502048S
	ZD902	1 1 1 1	Zener diode RD11EB2	502089S
	C901	1 1 1 1	C-CAP 0.01μf 500V YG	238103P
	C902,903	2 2 2 2	E-CAP 10000μf 56V	2100230
	C904,905	2 2 2 2	E-CAP 100μf 25V	211330S
	C906,907	2 2 2 2	E-CAP 10μf 25V	211320S
	C908,909	2 2 2 2	C-CAP 0.001μf +80, –20% 50V YG	231102Z
	C910	1 1 1 1	E-CAP 47μf 16V	211225S
	C911	1 1 1 1	E-CAP 220μf 16V	211232S
	C912,913	2 2 2 2	E-CAP 47μf 16V	211225S
	R901,902	2 2 2 2	RES 10kohm 5% 1/4W	328103J
	R903	1 1 1 1	RES 6.8kohm 5% 1/4W	328682J
	R904	1 1 1 1	RES 4.7kohm 5% 1/4W	328472J
	R905	1 1 1 1	RES 12kohm 5% 1/4W	328123J
	R906	1 1 1 1	RES 39kohm 5% 1/4W	328393J
	R907,908	2 2 2 2	FP-MO-RES 1.2kohm 5% 2W	362122L
	R909	1 1 1 1	RES 560ohm 5% 1/4W	328561J
	R910,911	2 2 2 2	RES 2.2kohm 5% 1/4W	328222J
			(PROTECTOR SECTION)	
	RY951	1 1 1 1	Relay – FBR323 – DC24V	1700370
	Q951,952	2 2 2 2	TR 2SA1015 (Y or GR)	510102S
	Q953,954	2 2 2 2	TR 2SC1815 (Y or GR)	512107S
	Q955	2 2 2 2	TR 2SC1627 (O or Y)	511017S
	D951,952	2 2 2 2	Diode 1SS55	501024S
	(D951,952)	(2 2 2 2)	Diode 1S2076A	501020S
	ZD951	1 1 1 1	Zener diode RD22EB4	502059S
	ZD952	1 1 1 1	Zener diode RD8.2EB1	502052S
	C951,953	2 2 2 2	E-CAP 10μf 16V	211220S
	C952	1 1 1 1	BP-CAP 100μf 16V	215230N
	C954	1 1 1 1	E-CAP 220μf16V	211232S
	C955	1 1 1 1	E-CAP 47μf 25V	211325S
	R951,952	2 2 2 2	RES 100kohm 5% 1/4W	328104J
	R953,954	2 2 2 2	RES 47kohm 5% 1/4W	328473J
	R955	1 1 1 1	RES 100kohm 5% 1/4W	328104J
	R956	1 1 1 1	RES 33kohm 5% 1/4W	328333J
	R957	1 1 1 1	RES 10kohm 5% 1/4W	328103J
	R958	1 1 1 1	RES 6.8kohm 5% 1/4W	328682J

PART ORDERING PROCEDURE ····· DO NOT USE THE "REF" NUMBER AND "SYMBOL" NUMBER. (these are control # for the factory only.) Include in any order: a. Part number, b. Part description, c. Model number. (any of the above lacking from an order may delay shipment of the order.)

REF. NO.	SYMBOL NO.	TYPE+ W	E	B	V	DESCRIPTION++	PART NO.
	R959	1	1	1	1	RES 39kohm 5% 1/4W	328393J
	R960	1	1	1	1	RES 10kohm 5% 1/4W	328103J
	R961	1	1	1	1	RES 82kohm 5% 1/4W	328823J
	R962	1	1	1	1	RES 8.2kohm 5% 1/4W	328822J
	R963	1	1	1	1	FP-MO-RES 1kohm 5% 1W	361102L
	R964	1	1	1	1	FP-RES 2.7kohm 5% 1/2W	329272L
						(LEVEL INDICATOR SECTION)	
	D921,922	2	2	2	2	Diode 1SS53	501023S
	(D921,922)	(2	2	2	2)	Diode DS448	501026S
	C923,924	2	2	2	2	E-CAP 10μf 16V	211220S
	R923	1	1	1	1	Potentiometer 1kohm	4300720
	R921,922	2	2	2	2	RES 18kohm 5% 1/4W	328183J
	R924	1	1	1	1	RES 330ohm 5% 1/4W	328331J
	R925,926	2	2	2	2	RES 820ohm 5% 1/4W	328821J
	R927,928	2	2	2	2	RES 18kohm 5% 1/4W	328183J
	R929,930	2	2	2	2	RES 8.2kohm 5% 1/4W	328822J
	R931,932	2	2	2	2	RES 3.3kohm 5% 1/4W	328332J
						POWER SWITCH P.C. BOARD ASSEMBLY	
⚠	S001	1	–	–	–	Switch, push – ESB-70405T	4041780
⚠	S001	–	1	1	1	Switch, push – ESB-90179S	4041600
⚠	F001	1	–	–	–	Fuse – 5.0A 250V	4700540
⚠	F001	–	1	1	–	Midget fuse – T2A 250V	4720370
⚠	F001	–	–	–	1	Fuse – 5.0A 250V – for AC110 or 120V	4700540
⚠	F001	–	–	–	1	Fuse – 3.0A 250V – for AC220 or 240V	4700630
⚠	C001	1	–	–	–	M-CAP 0.01μf AC125V	284103M
⚠	C001	–	1	1	1	M-CAP 0.01μf AC250V	283103M

REF. NO.	SYMBOL NO.	TYPE+ W	E	B	V	DESCRIPTION++	PART NO.
						INPUT P.C. BOARD ASSEMBLY	
★	401	1	1	1	1	Terminal, RCA phono pin jack – 2P x 3 – phono/tuner/aux	4446040
★	402	2	2	2	2	Terminal, RCA phono pin jack – 2P x 2 – tape 1/2	4444100
★	403	–	1	1	–	Connector, DIN type 5P	4530560
	C417	1	1	1	1	C-CAP 0.01μf. +80, –20% 50V YG	231103Z
	R501~R508	8	8	8	8	RES 1meg.ohm 5% 1/4W	328105J
	R509~R512	4	4	4	4	RES 2.2kohm 5% 1/4W	328222J
	R513,514	–	2	2	–	RES 330kohm 5% 1/4W	328334J
	R515,516	–	2	2	–	RES 100kohm 5% 1/4W	328104J
						(INDICATOR SECTION)	
	LED501,502	2	2	2	2	LED TLR120A – tape indicator, red	5060480
	LED503~ 505	3	3	3	3	LED TLG113A – function indicator, green	5060470
						OUTPUT P.C. BOARD ASSEMBLY	
		1	1	1	1	Switch, twin push – SUF-23 – speakers A/B	4042090
★	501	1	1	1	1	Terminal, speakers – 8P	4450640
★	502	1	1	1	1	Jack, headphones	4550360
	L701,702	2	2	2	2	Coil, choke – 1μH	1210960
	C725,726	2	2	2	2	M-CAP 0.047μf 10% 50V	222473K
	R779,780	2	2	2	2	FP-MO-RES 10ohm 5% 1W	361100L
	R781,782	2	2	2	2	FP-MO-RES 330ohm 5% 1W	361331L
	R783,784	2	2	2	2	FP-MO-RES 10ohm 5% 2W	362100L

SEMICONDUCTOR DATA

TRANSISTORS

DEVICE TYPE	APPLICATIONS	STRUCTURE†	MAXIMUM RATINGS Absolute-Maximum Values: (T_A = 25°C unless otherwise specified)					ELECTRICAL CHARACTERISTICS Typical Values: (T_A = 25°C unless otherwise specified)											MANUFACTURER
			Collector-to-Base Voltage V_{CBO} (V)	Emitter-to-Base Voltage V_{EBO} (V)	Collector Current I_C (mA)	Collector Dissipation P_C (mW)	Junction Temperature T_J (°C)	Collector Cutoff Current I_{CBO} (uA)	V_{CB} (V)	Static Forward-Current Transfer Ratio hFE	V_{CE} (V)	I_C (mA)	Collector-Emitter Saturation Voltage $V_{CE(sat)}$ (V)	I_C (mA)	I_B (mA)	Gain-Bandwidth Product f_T fab* (MHz)	V_{CE} V_{CB}* (V)	I_E I_C* (mA)	Output Capacitance Cob (pF)	Others	
2SA817 (O, Y)	AF,Driver	PNP Si-E	−80	−5	−300	600	150	−0.1 max.	−50	70 ~240	−2	−50	−0.4 max.	−200	−20	100	−10	−10*	14	Complementary to 2SC1627	TOSHIBA
2SA1015 (Y, GR)	AF, General	PNP Si-E	−50	−5	−150	400	125	−0.1 max.	−50	120 ~400	−6	−2	−0.3 max.	−100	−10	80 min.	−10	−1*	7 max.	Complementary to 2SC1815	TOSHIBA
2SB646A07 (B, C)	AF, Voltage amp.	PNP Si-E	−150	−5	−50	900	150	−10 max.	−100	60 ~200	−5	−10	−2 max.	−30	−3	140	−5	−10*	4	Complementary to 2SD666A07	HITACHI
2SB649 (B, C)	AF, Driver	PNP Si-E	−180	−5	−1.5A	20W (Tc=25°C)	150	−10 max.	−160	60 ~200	−5	−150	−1 max.	−500	−50	140	−5	−150*	27	Complementary to 2SD669	HITACHI
2SB755 (R, O)	AF, Power amp.	PNP Si-Td	−150	−5	−12A	120W (Tc=25°C)	150	−50 max.	−150	55 ~160	−5	−1A	−2 max.	−5A	−500	20	−10	−1A*	450	Complementary to 2SD845	TOSHIBA
2SC1627 (O, Y)	AF, Driver	NPN Si-E	80	5	300	600	150	−0.1 max.	50	70 ~240	2	50	0.5 max.	200	10	100	10	10*	10	Complementary to 2SA817	TOSHIBA
2SC1815 (Y, GR)	AF, General	NPN Si-E	60	5	150	400	125	0.1 max.	60	120 ~400	6	2	0.25 max.	100	10	80 min.	10	1*	3 max.	Complementary to 2SA1015	TOSHIBA
2SC2240 (GR, BL)	AF, Low noise	NPN Si-E	120	5	100	300	125	0.1 max.	120	200 ~700	6	2	0.3 max.	10	1	100	6	1*	3		TOSHIBA
2SD666A07 (B, C)	AF, Voltage amp.	NPN Si-E	150	5	50	900	150	10 max.	100	60 ~200	5	10	2 max.	30	3	140	5	10*	3	Complementary to 2SB646A07	HITACHI
2SD669 (B, C)	AF, Driver	NPN Si-E	180	5	1.5A	20W (Tc=25°C)	150	10 max.	160	60 ~200	5	150	1 max.	500	50	140	5	500*	14	Complementary to 2SB649	HITACHI
2SD845 (R, O)	AF, Power amp.	NPN Si-Td	150	5	12A	120W (Tc=25°C)	150	50 max.	150	55 ~160	5	1A	2 max.	5A	500	20	10	1A*	200	Complementary to 2SB755	TOSHIBA

FIELD EFFECT TRANSISTORS

DEVICE TYPE	APPLICATIONS	STRUCTURE†	MAXIMUM RATINGS Absolute-Maximum Values: (T_A = 25°C unless otherwise specified)							ELECTRICAL CHARACTERISTICS Typical Values: (T_A = 25°C unless otherwise specified)																MANUFACTURER
			Gate-to-Drain Voltage V_{GDO} (V)	Gate-to-Source Voltage V_{GSO} (V)	Gate Current I_G (mA)	Drain Current I_D (mA)	Total Dissipation P_D (mW)	Channel Temperature T_{ch} (°C)	Gate Leak Current Test Conditions	Gate Leak Current I_{GSS} (nA)	Gate to Drain Breakdown Voltage Test Conditions	Gate to Drain Breakdown Voltage $V_{(BR)GDO}$ (V)	Drain Current Test Conditions	Drain Current I_{DSS} (mA)	Gate to Source Cutoff Voltage Test Conditions	Gate to Source Cutoff Voltage $V_{GS(off)}$ (V)	Forward Transfer Admittance Test Conditions	Forward Transfer Admittance Y_{fs} (m℧)	Feed Back Capacitance Test Conditions	Feed Back Capacitance C_{rss} (pF)	Power Gain (Common Source) Test Conditions	Power Gain (Common Source) GPS (dB)	Noise Figure Test Conditions	Noise Figure NF (dB)	
2SK-150A (GR,BL)	AF, Low noise Differential amp.	Si N-channel junction (Dual)	−50	−50	10		200/unit	125	V_{GS}=−30 V_{DS}=0	−1 max.			V_{DS}=10V V_{GS}=0	2.6 ~14			V_{DS}=10V V_{GS}=0 f=1kHz I_{DSS}=3mA	12	V_{DG}=10V I_D=0 f=1MHz	3			V_{DS}=10V R_g=1k I_D=1mA f=1kHz	2 max	TOSHIBA
2SK-170 (GR)	AF, Low noise	Si N-channel junction	−40	−40	10		400	125	V_{GS}=−30V V_{DS}=0	−1 max.			V_{DS}=10V V_{GS}=0	2.6 ~6.5			V_{DS}=10V V_{GS}=0 f=1kHz	22	V_{DG}=10V I_D=0 f=1MHz	6			V_{DS}=10V R_g=1kΩ I_D=1mA f=1kHz	2 max	TOSHIBA
2SK-246 (Y,GR)	Inpedance converter	Si N-channel junction	−50		10		300	125	V_{GS}=−30V V_{DS}=0	−1 max.	V_{DS}=0 I_G=−100μA	−50 min.	V_{DS}=10V V_{GS}=0	1.2 6.5	V_{DS}=10V I_D=0.1μA	−6 max.	V_{DS}=10V V_{GS}=0 f=1kHz	2.5 min.	V_{DG}=10V I_D=0 f=1MHz	2.5					TOSHIBA

DIODES, LEDS

DEVICE TYPE	APPLICATIONS	STRUCTURE†	MAXIMUM RATINGS Absolute - Maximum Values: (T_A = 25°C unless otherwise specified)									ELECTRICAL CHARACTERISTICS Typical Values: (T_A = 25°C unless otherwise specified)							MANUFACTURER
			Reverse Surge Voltage V_{Rsurge} (V)	Peak Reverse Voltage V_{RM} (V)	Reverse Voltage V_R (V)	Peak Forward Voltage V_{FM} (V)	Peak Forward Current I_{FM} (mA)	Average Rectified Current I_O (mA)	Forward Surge Current $I_{F\,surge}$ (A)	Junction Temperature T_J (°C)	Total Power Dissipation P_D (mW)	Forward Current I_{Fmin} (mA)	Forward Current Test Condition V_F (V)	Forward Voltage V_{Fmax} (V)	Forward Voltage Test Condition I_F (mA)	Reverse Current I_{Rmax} (μA)	Reverse Current Test Condition V_R (V)	Others	
1SS53	Medium speed switching	Si-EP		35	30		300	100	2	200	500			0.8 1.0	1.0 30	0.1	30		NEC
1SS55	Medium speed switching	Si-EP		100	75		300	100	2	200	500			0.8 1.0	1.0 30	0.1	75		NEC
DS448	Medium speed switching	Si-P		35	30		360	120	0.5	175	300			1.0	50	1.0	30		SANYO
1S2076A	Medium speed switching	Si-EP		70	60		450	150	1	175	250			0.8	10	1.0	30		HITACHI
W02	Rectifier	Si-DJ (Bridge)			200	200		1.5A	50	125				1.0	1.0A	10		Rth=50°C/W	GENERAL INSTRUMENT
GP30D-L	Rectifier	Si-DJ	200	200	140			3.0A	125	150				1.1	3.0A	5.0			GENERAL INSTRUMENT
TLG113A	Lamp (green)	GaP			4			IF= 25mA		75	100			2.8	20	5	4	Iv=17.0mcd (IF=15mA)	TOSHIBA
TLR120A	Lamp (red)	GaP			4			IF= 20mA		75	90			2.8	20	5	4	Iv=4.0mcd (IF=15mA)	TOSHIBA

ZENER DIODES

DEVICE TYPE	APPLICATIONS	STRUCTURE†	MAXIMUM RATINGS Absolute Maximum Values: (T_A = 25°C unless otherwise specified)			ELECTRICAL CHARACTERISTICS Typical Values: (T_A = 25°C unless otherwise specified)												Others	MANUFACTURER
						Zener Voltage				Differential Resistance			Temperature Coefficient			Reverse Current			
						VZ			Test Conditions	RZ		Test Conditions	Z		Test Conditions	IZ	Test Conditions		
			Total Power Dissipation PD (mW)	Zener Current IZ (A)	Junction Temperature TJ (°C)	MIN (V)	TYP (V)	MAX (V)	IZ (mA)	TYP (Ω)	MAX (Ω)	IZ (mA)	TYP (%/°C)	MAX (%/°C)	IZ (mA)	MAX (μA)	VR (V)		
RD6.2-EB2	Regulator	Si-J	400		175	5.96		6.27	20		20	20				5	3		NEC
RD8.2-EB1	Regulator	Si-J	400		175	7.53		7.92	20		10	20				2	5		NEC
RD11-EB2	Regulator	Si-J	400		175	10.50		11.05	10		15	10				2	8		NEC
RD13-EB3	Regulator	Si-J	400		175	12.99		13.66	10		25	10				2	10		NEC
RD22-EB4	Regulator	Si-J	400		175	21.52		22.63	5		60	5				2	17		NEC

INTEGRATED CIRCUITS NJM4558D/TL4558P

■ APPLICATION: DUAL OPERATIONAL AMPLIFIER

■ MANUFACTURER: JRC (NJM4558D)/Texas Instruments (TL4558P)

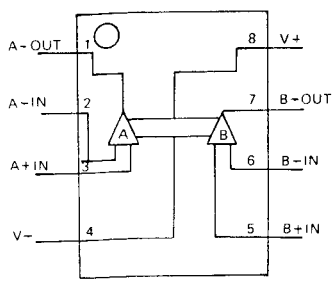
ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	NJM4558D	TL4558P	UNITS
Supply Voltage	V_S	±18	±18	V
Total Power Dissipation	P_T	500	680	mW
Differential Input Voltage	V_{ID}	±30	±30	V
Input Voltage	V_{ICM}	±15	±15	V
Storage Temperature	Tsrg	−40 ~ +125	−65 ~ +150	°C
Operating Temperature	Topt	−20 ~ +75	−20 ~ +70	°C

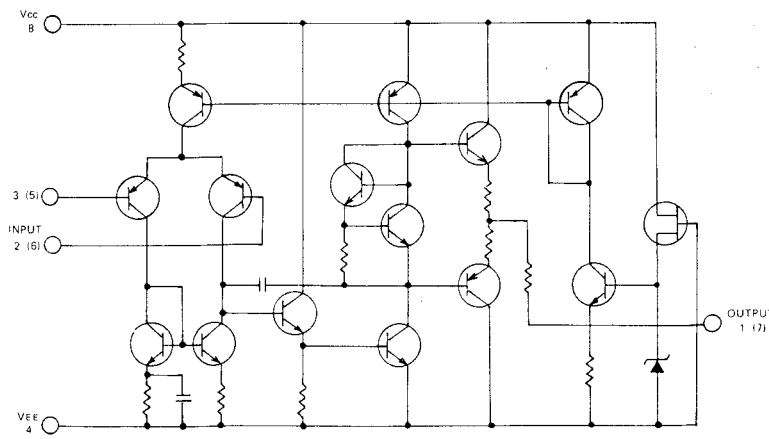
ELECTRICAL CHARACTERISTICS (Ta = 25°C, Vs = ±15V)

ITEM	SYMBOL	CONDITIONS	NJM4558D			TL4558P			UNITS
			MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Input Offset Voltage	V_{IO}	$R_S \leqq 10k\Omega$			6.0		0.5	6.0	mV
Input Offset Current	I_{IO}				200		5	200	nA
Input Bias Current	I_B				500		40	500	nA
Large-Signal Voltage Gain	A_V	$R_L \geqq 2k\Omega, V_O = \pm 10V$	86			86	110		dB
Output Voltage Swing	V_{om}	$R_L \geqq 10k\Omega$	±12			±12	±14		V
Common Mode Rejection Ratio	CMR	$R_S \leqq 10k\Omega$	70			70	90		dB
Supply Voltage Rejection Ratio	SVR	$R_S \leqq 10k\Omega$			150		30	150	μV/V
Power Consumption	Pd	both channel			170		75	170	mW

TERMINAL GUIDE (TOP VIEW)



EQUIVALENT CIRCUIT (1/2 CIRCUIT)



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